U.S. DEPARTMENT OF ENERGY | Nuclear Energy

Nuclear Energy University Programs (NEUP) Fiscal Year (FY) 2015 Annual Planning Webinar

IRP-FC-2: Canister Corrosion Evaluation

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IRP-FC-2: Canister Corrosion Evaluation

Introduction

- The majority of spent fuel dry storage systems include a stainless steel canister to house the spent fuel. The canister can then be transferred to the storage overpack and transportation overpack
- During storage in the overpack, there is concern that deliquescence of atmospheric water will facilitate corrosion initiation
- This corrosion initiation, coupled with canister surface conditions and residual welds, may lead to stress corrosion cracking
- R&D work is needed from experimental, field testing, and analytical areas

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Background

- **Experimental: It is assumed that SCC will occur during the storage life of the canisters. Work is needed to demonstrate SCC initiation conditions, crack growth rates, and crack arrest conditions and characteristics**
- **Field testing: Collaboration with industry and the DOE labs is needed to develop diagnostic tools for detection of cracks and assessment of crack growth. Tool development will include work in a highly rad field involving canisters that are in service**
- **Analytical application: Create a tool that provides a predictive capability for different storage systems and environmental conditions**
- **The focus of this work will be applied engineering to solve a regulatory and technical issue facing the commercial nuclear industry**

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- **Objective:**
- **New technology/technologies to support the design of simplified tool(s) that can be used for SCC predictive capability for different storage systems and environmental conditions**

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- **Work to be Performed:**
- Innovative methodology development
- Proof of principle evaluation
- Develop and demonstrate feasibility of the methodology
- Identify and quantify inherent uncertainties
- Systematically develop uncertainties associated with the methodology and its application to a basic system
- Develop and implement a “mock-up” test program
- Assemble a system for field demonstration
- Conduct a field demonstration and develop an evaluation of the field study
- Prepare a detailed final report

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- **Tasks to be Performed:**
- **Task 1: Development of an integrated plan, technology development and testing – at 3 months**
- **Task 2: Methodology development – at 9 months**
- **Task 3: Proof of principle testing and uncertainty evaluation – at 15 months**
- **Task 4: Develop and implement "mock-up" tests – at 26 months**
- **Task 5: Field demonstration – at 33 months**
- **Task 6: Complete project report – at 36 months**

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- **Deliverables**
- **Periodic progress reports – every 6 months;**
- **Technology assessment report – 18 months after beginning of performance period**
- **Final project report – 36 months after beginning of performance period**